NAVAL AVIATION DEPOT, North Island Naval Air Station: INFRASTRUCTURE IMPROVEMENT PROGRAM; Naval Region Southwest: Proposed Projects

Energy Efficient Technologies for Government Buildings - New and Retrofits, Second Industry Workshop Chicago, Illinois, USA, 2006-01-20

Gary G. Gates, P.E., C.E.M.
Program Manager
NAVFAC Southwest
619-532-3986
gary.gates@navy.mil

Naval Aviation Depot, NADEP North Island

- Located at North Island, CA:
  - Primarily Aircraft Rework/Overhaul
  - 2000 People
  - $500 Million Budget
  - $4.5 Million Energy/Water Budget
  - 8000 point Siemens EMS/DDC
  - Excellent Water Conservation
  - A Goldmine of Opportunities

- Energy Efficient Technologies for Government Buildings - New and Retrofits, Second Industry Workshop, Chicago, Illinois, USA, January 19-20, 2006.

Overview:

- P-754 - **$3.9 million Awarded** (ECIP Funded) 85 Percent Complete
  - Heat Treat Steel Furnace Quench, Washer, Cover Gas – B472
  - Plating/Cleaning Controls for Tank Heating, Filters, Agitation – B472
  - Hard Chrome Tank Covers to meet 2006 EPA Requirements – B472
  - Motor Replacement – Various Buildings
  - Report Generation – Uses PWC Meter Data to Generate a Report in 4 Hours vice 40
  - Total savings of $486,000
- P-753 - **$2.6 million Awarded** (ECIP Funded) 15 Percent Complete
  - Compressed Air Retrofits – Various Buildings
  - (2)125 Ton Chillers with Turbocor and Hartman Loop DDC Upgrades – B469
  - (1) 90 Ton Turbocor Compressor Replacement DDC Upgrades – B250
  - Lighting Replacement – Various Buildings
  - High Bay Lighting Demo 440 watt HID Lights with Electronic Ballasts (18 fixtures) – B378
  - Tank Cover with Heating Coil for Methylene Chloride – B472
- P-752 - **$10 million – Proposed** (Financed)
  - 39 Excellent Potential Projects
  - Navy Payback Approximately 7.0 Years
  - Very Significant Infrastructure Improvement of HVAC, EMS/DDC
  - Incentives - State of California will Pay $.25 - .30/kwh saved (Approximately 25 percent of the construction cost)

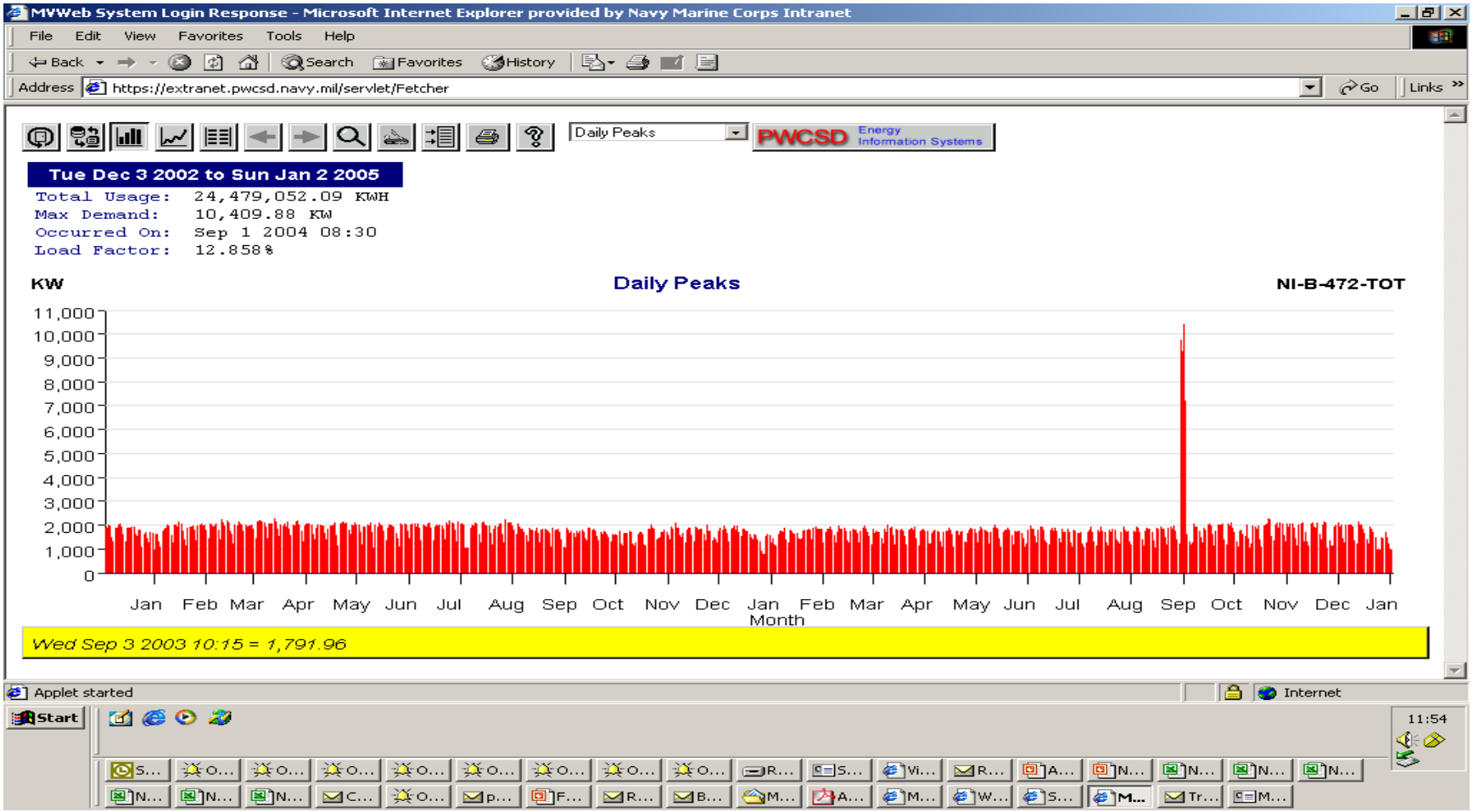
Firsts:

- Hard Chrome Tank Covers Meeting Proposed FY2006 EPA Requirements – Awarded (One Year for SDAPCD Approval to Construct; Awaiting Industrial Hygienist and SDAPCD Approvals)
- Turbocor Chiller with Hartman Loop in DoD (Primary/Secondary) – Installed
- Zero-Discharge in Plating/Cleaning Operations – Awaiting Funding
- Zero-Discharge in Paint Strip Operations – Awaiting Funding
- Cleaning Tank Covers – Awaiting Design

NADEP – Top Ten Buildings

BLDG	FT2	FUNCTION	PRECENT USAGE BY BLDG	ESTIMATED AVE USAGE (MW)	ESTIMATED NIGHT USAGE (MW)	ESTIMATED AVE COST/YR	PERCENT
472	304,733	MANUFACTURING & PROCESS	23%	1.35	1.00	$1,195,244	74.07%
463	145,751	AVIONICS AND CALIBRATION	14%	0.82	0.70	$726,000	85.37%
465-468	85,312	PAINT/STRIP COMPLEX	9%	0.55	0.30	$486,951	54.55%
378	105,280	HANGER INSTRUMENT SHOPS & ENGINEERING	9%	0.55	0.35	$486,951	63.64%
469	50,000	MATERIALS LAB & PRIMARY STANDARDS LAB	8%	0.44	0.42	$389,561	95.45%
379	229,062	HYDRAULICS AND COMPONENTS	7%	0.48	0.25	$424,976	52.08%
334	78,264	ENGINEERING AND COMPUTER SUPPORT	6%	0.28	0.25	$243,476	90.91%
250	115,297	COMPOSITE REPAIR	6%	0.38	0.28	$332,012	73.33%
94	66,900	AIRCRAFT HANGER & ADMIN OFFICES	3%	0.04	0.02	$30,988	57.14%
317	69,922	ENGINEERING OFFICES & ATE	3%	0.09	0.06	$79,683	61.11%
-	N/A	REMAINING FACILITIES	12%			$0	
TOTAL:	1,250,521		**100%**	4.97	3.62	**$4,395,842**	

B 472 Loads:


MVWeb System Login Response - Microsoft Internet Explorer provided by Navy Marine Corps Intranet
File Edit View Favorites Tools Help
Back Search Favorites History
Address https://extranet.pwcsd.navy.mil/servlet/Fetcher
Go Links
Daily Peaks
PWCSD Energy Information Systems
Tue Dec 3 2002 to Sun Jan 2 2005
Total Usage: 24,479,052.09 KWH
Max Demand: 10,409.88 KW
Occurred On: Sep 1 2004 08:30
Load Factor: 12.858%
KW
Daily Peaks
NI-B-472-TOT
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan
Month
Wed Sep 3 2003 10:15 = 1,791.96
Applet started
Internet
Start
11:54

B 378 Instruments - Installed

- HID Lighting
- Installed Demo of 18 Fixtures of 440 watts
- Replaced 1000 watts Lamps
- 100 foot-candles
- High CRI -Excellent Color Rendition

B 472 Heat Treat Shop - Installed

- **New Lindberg Steel Furnace, Integral Quench, Water Wash**
- **Replaced Three WWII Furnaces and an Endo-Thermic Gas Generator that were on 24/7**
- **$1.375 Million**
- **Navy Payback: 8.4 Years**
- **Higher Cost Covered by Other Projects**

B 472 Heat Treat Shop - Installed

- Methanol Storage – Used for Maintaining Carbon Levels
- Liquid Nitrogen Tank – Used for a Cover Gas
- Saves Electricity & Natural Gas
- Reduced Maintenance
- Much Improved Processing Control

B 472 Plating Shop - Installed

- Controls for Tanks - Steam, Agitation, and Filtration
- Cost: $1.345 million for Plating/Cleaning
- Navy Payback: 5.8 Years

B 472 Cleaning Shop - Installed

- Controls for Tanks - Steam, Agitation, and Filtration
- Cost: $1.345 million for Plating/Cleaning
- Navy Payback: 5.8 Years

B 472 Cleaning Shop - Installed

- Inductors for Agitation vice Air or Impellers

Reports – Sample Report Generated from Navy Public Works Center Meter Data - Completed

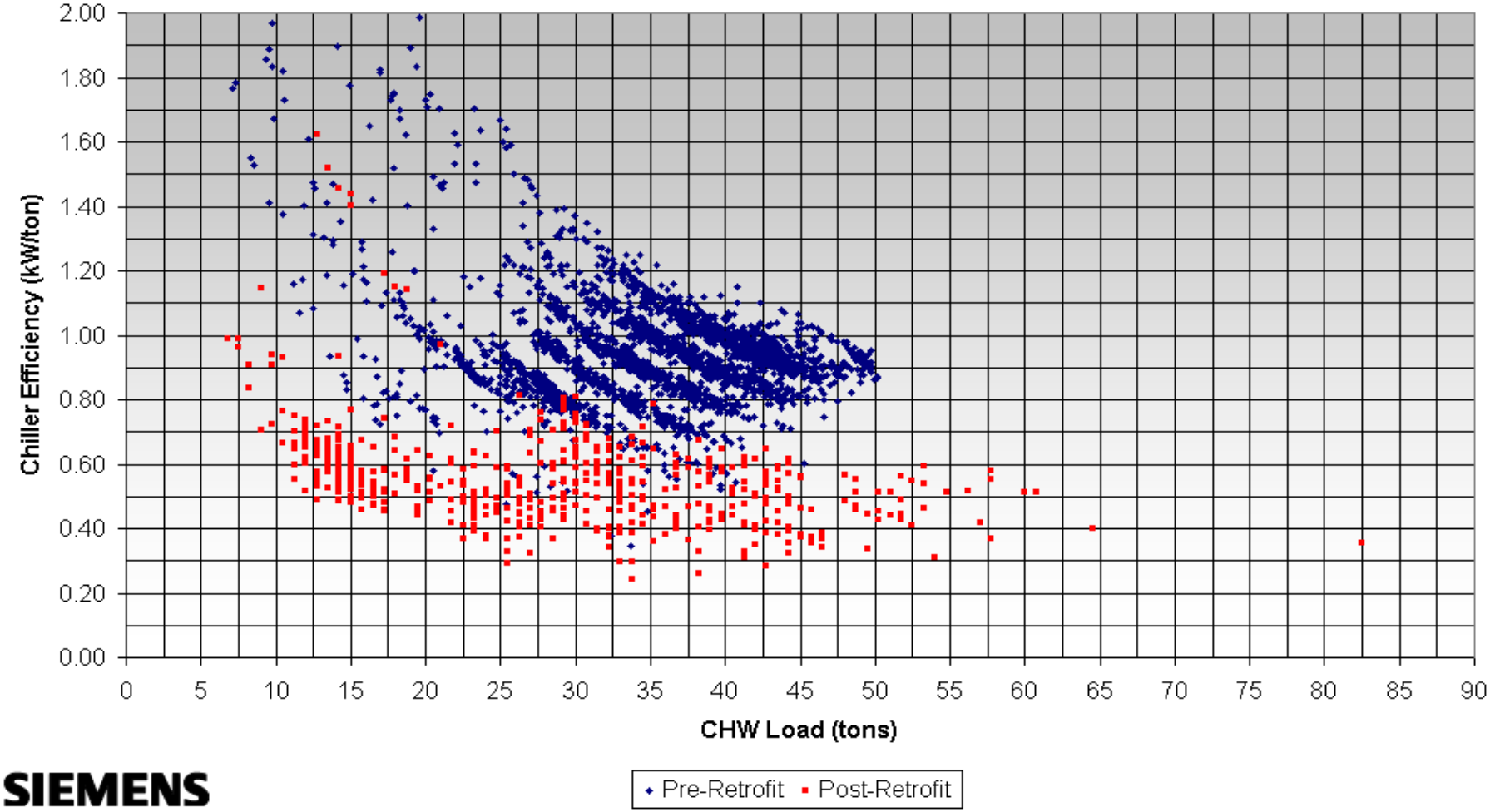
- It took 30 Hours to Generate a Much Less Inclusive Report vice 4 Hours for This
- Cost: $40,000
- Written in Access
- Easy to See what is Happening
- Navy Property

Various - Installed

- Motor Replacement
- Cost: $641,000
- Navy Payback: 3.3

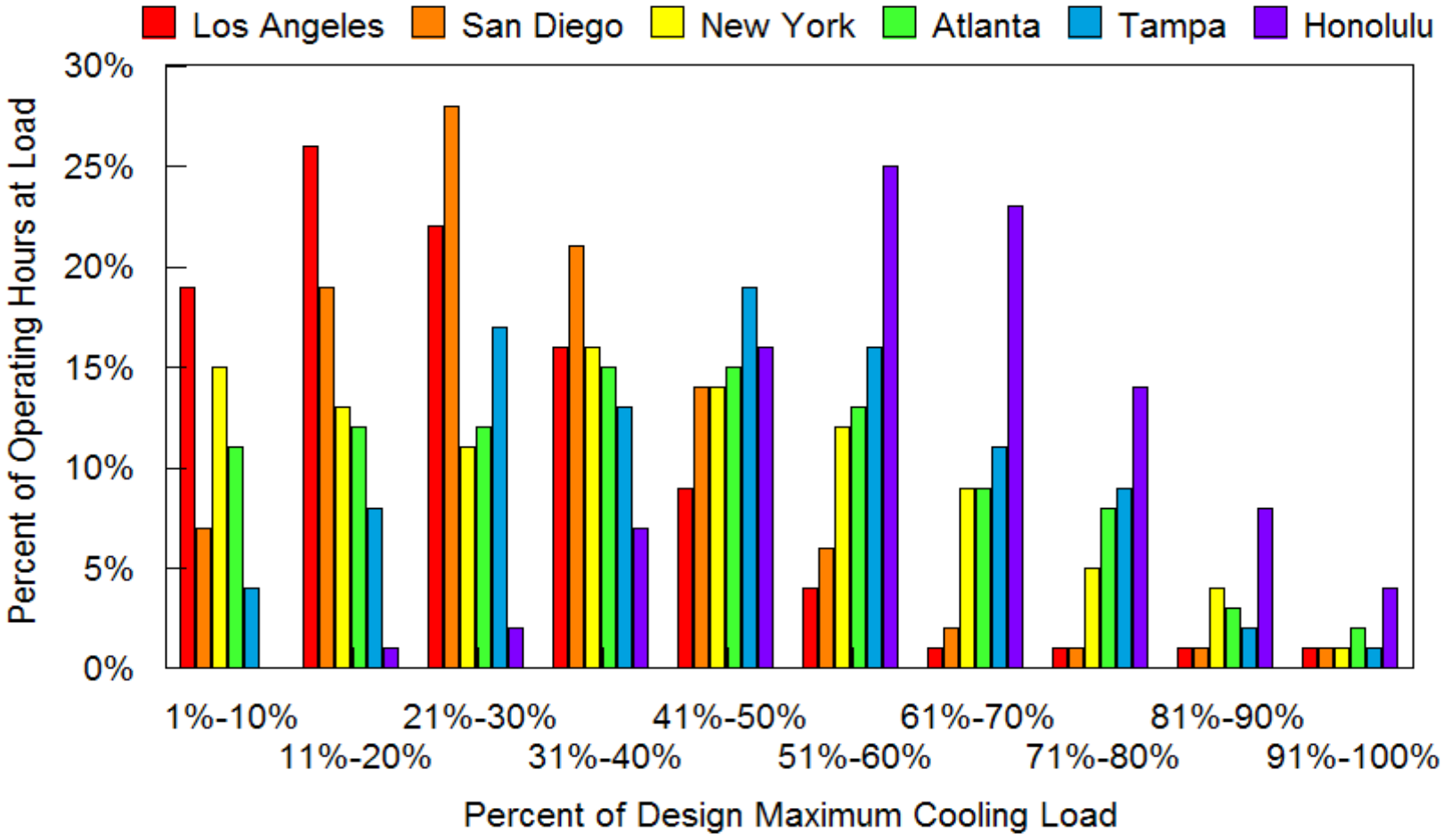
B 250 Composites Building – Installed

North Island NAS, NADEP Building 250
90-Ton Air-Cooled Chiller Retrofitted with Turbocor Compressor
Initial Pre-Retrofit and Post-Retrofit Performance Comparison



SIEMENS

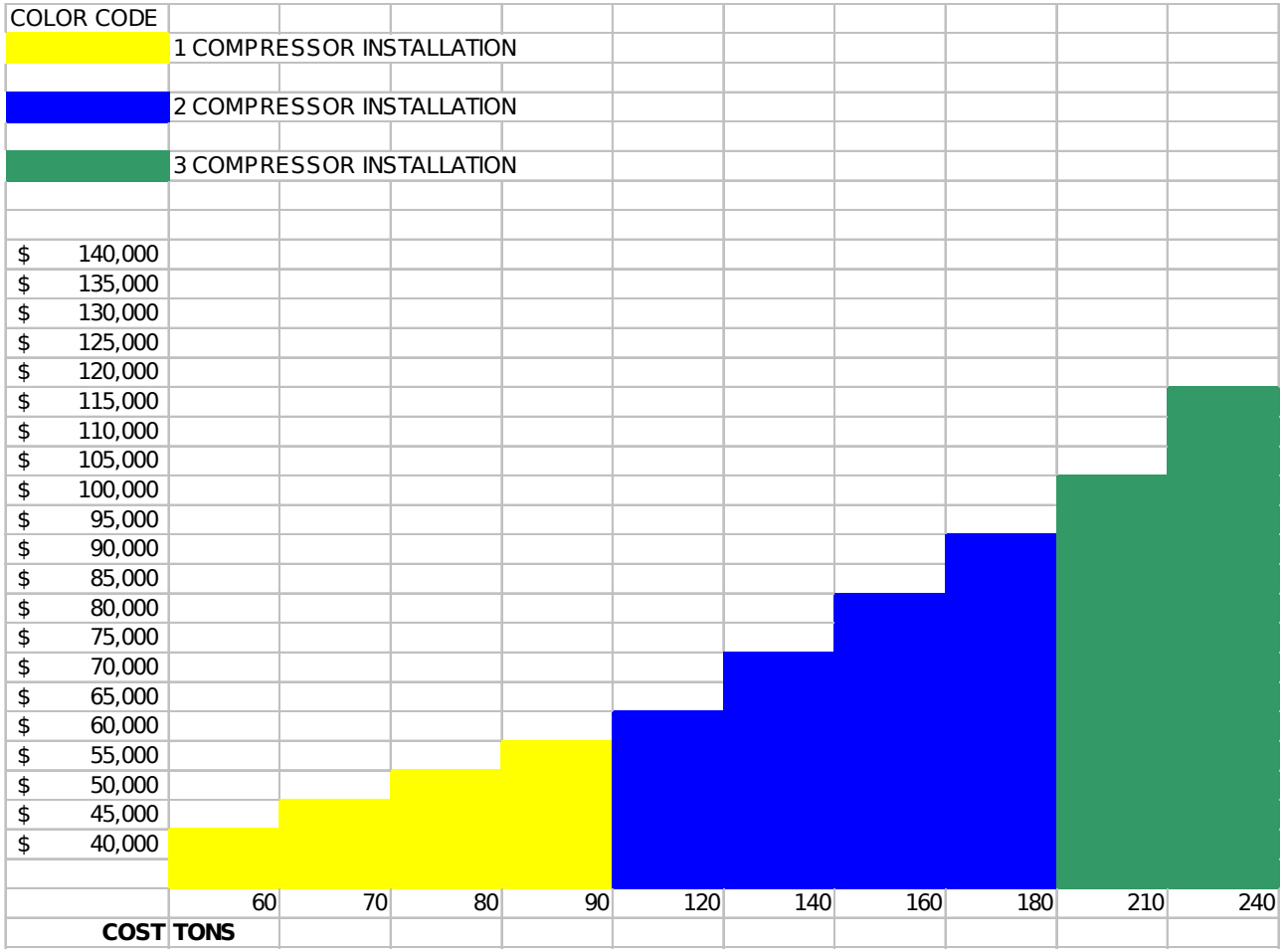
Characteristics of Comfort Cooling Loads for Various Climates (temperate, tropical and transitional) - Tom Hartman



B 250 Composites Building – Installed

- Retrofit Compressor on Existing Air-Cooled Chiller
- Navy Techval Program Installed Two: San Diego & Newport, RI
- Shows Approximately 35-50 Percent Savings at Part Load
- www.turbocor.com

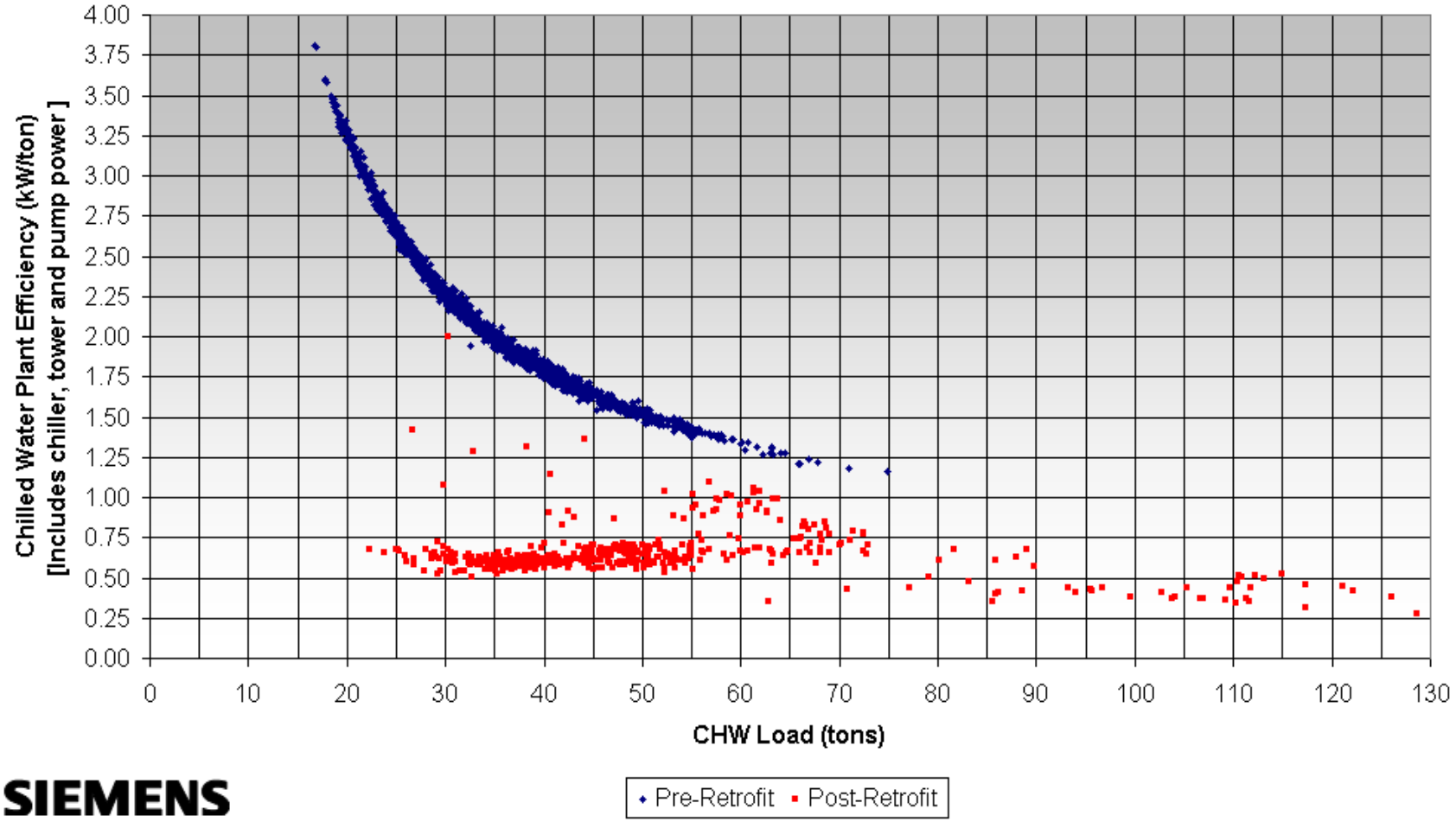
Turbocor Installation Guide



B 469 Material's Lab/Western Standards Lab –

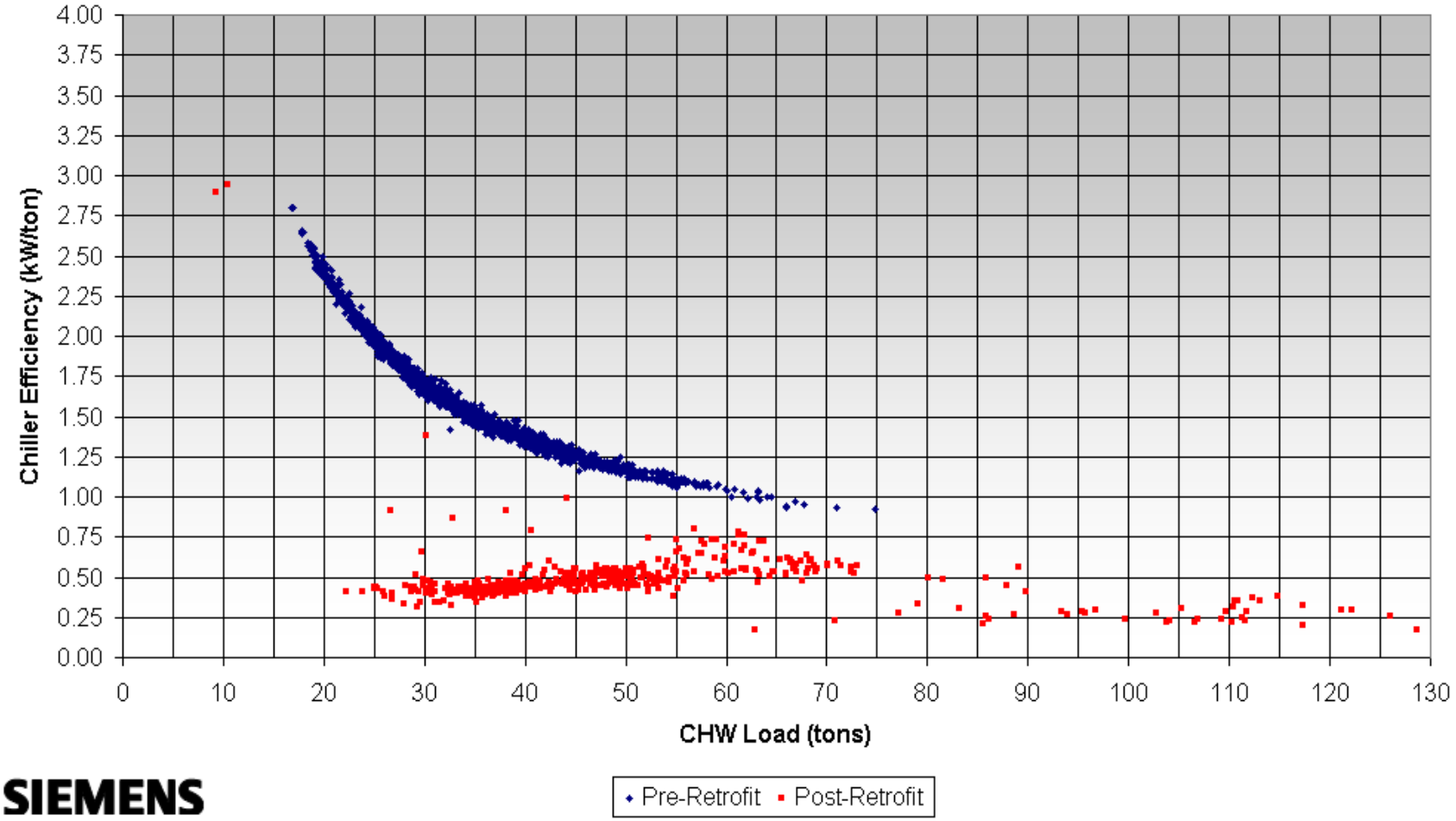
- Hartman Loop – Phase I with Controls Integrated with Siemens EMS/DDC
- 2 Chillers with Turbocor Compressors 2 Each
- First in DoD
- Expect .6 kw/ton

North Island NAS, NADEP Building 469
Chilled Water Plant Retrofit
(Including New McQuay Chillers Equipped with Turbocor Compressors and Variable Volume Pumping)
Initial Chilled Water Plant Performance Comparison



SIEMENS

North Island NAS, NADEP Building 469
Chilled Water Plant Retrofit
(Including New McQuay Chillers Equipped with Turbocor Compressors and Variable Volume Pumping)
Initial Chiller Performance Comparison

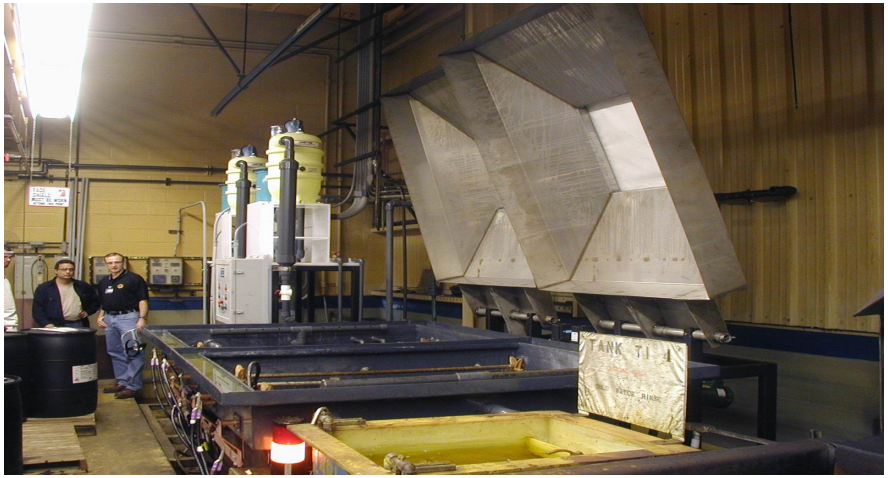


SIEMENS

B 472 Plating Shop - Awarded

- Replaces Hard Chrome Tank Scrubbers Operating 24/7
- First Tank to be Completed by 15 February 2006
- Cost: $332,000
- Navy Payback: 1.88 Years

B 472 Plating Shop - Awarded



- Hard Chrome Tank Ventilation Using a Cover vice Push/Pull Ventilation
- Replace Existing Ventilation with a Patented XXXX Cover for 5 Tanks
- Running a Year Late

B 250 Composite's Building - Proposed

- 1 MW Photovoltaic Carport System
- Cost: $7.2 Million
- Incentives: $2.8 Million
- Awaiting Incentives and NADEP Approval
- Savings: $135,000/Year

B 469 Material's Lab/Western Standards Lab -

- Phase II with Controls Integrated with Siemens EMS/DDC Variable Air Distribution System
- Remove DX Units from Roof

All NADEP Bldgs - Proposed

- Wireless Steam Traps; Condensate Pumps
- 900 Mhz Wireless to EMS/DDC to Instantly Detect Steam Leaks
- Cost: $1 million
- Payback Highly Dependent on Yearly Steam Rates – 5 Years

B 464 Complex - Proposed

- Zero Discharge Paint Strip Effluent
- NADEP Treatment Cost is $1.10/gal
- $550,000
- Navy Payback: 3 Years
- NADEP Payback: .75 Years

B 472 Plating Shop - Proposed

- Zero Discharge & Reverse Osmosis – Processes for all Plating and Cleaning Effluent
- NADEP Treatment Cost is $1.10/gal
- $600,000
- Navy Payback: 9.5
- NADEP Payback: 3.6

B 472 Cleaning Shop - Proposed

- Install 22 Covers for all Cleaning Tanks to Reduce Airflow
- Only Three Tanks would be Open at a Time; Control via VFD's
- $1.2 Million
- Navy Payback: 4-5 Years

B 472 Cleaning Shop – Prototype Installed

Cimetrics/Anthem - Proposed

- Cimetrics/Anthem – Siemens Test Case in Top Ten NADEP Buildings
- Provides a Method of Recommissioning via looking at DDC Points and Comparing the Information with Algorithms
- A Listing of Recommendations is provided; Review; and then repairs are Implemented
- Ballpark Savings of $.10 - $.30/ft2 when Recommendations are Implemented

Various - Proposed

- Night Time Load Reduction – B472 1 MW Base Load

Naval Region Southwest:

- Comprised of the following bases on the West Coast totaling an estimated 20 Million Square feet:
  - Naval Base Coronado
  - Naval Base San Diego
  - Naval Base Point Loma
  - NAS Fallon
  - NBVC Ventura
  - NSWC Corona
  - NAWC China Lake
  - NAF El Centro
  - NPS Monterey
  - NWS Seal Beach
  - NAS Lemoore

Retro-Commissioning & Chiller Compressor Replacement & Hartman Loop

- The Region has accomplished Substantial Building Retrofits. Unfortunately, the Maintenance has been Inadequate and Savings Have Not been Obtained.
- Retro-Commissioning will Correct Buildings Deficiencies via a pending CPUC Program
- Then for Air/Water Cooled Chillers > 60 Tons, Turbocor Compressors will be Investigated. Estimated 45-60.
- For Very Large Chiller Applications, Hartman Loop Technology will be Investigated and VFD’s will be Installed in More Locations
- 25-30 % Rebates Available under CPUC Programs
- Ballpark Project Cost is 5 Million with an Overall 4-5 Year Payback

T8 TO T5 RETROFIT USING FIXTURE REPLACEMENT

Lamp/Ballast	Watts	Lumens	Energy Saved
FO32T8/700 QT3X32ISN	88	4915	-
FP28T5/PM/ECO QTP2X28PS95	60	5150	32%
FP28T5/PM/ECO QTP2X28PS95 @ 50%	28	1900	68%

T8 TO T5 RETROFIT: CONCERNS

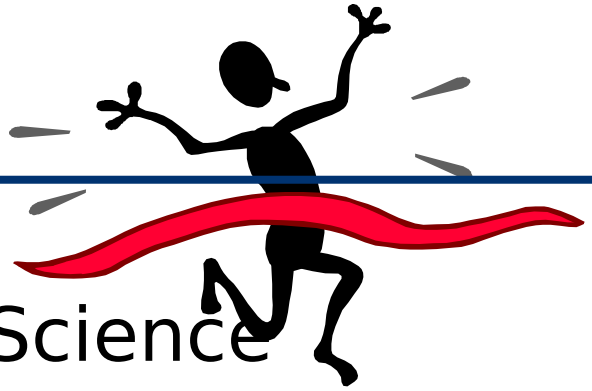
- For the T-12 to T-8 the Cost was $.61/ft2; payback 5.5 years; with a 30 percent CPUC incentive; Electricity Cost Approximately $65/MWH
- Replacement with T-5 Fixtures Provides Much Better Lighting, but at a Substantially Increased Cost
- Unfortunately the EPAC requires a 2 percent Reduction per Year. This will Force Longer Paybacks to Achieve Results at Those Facilities that have Met Previous Goals

T8 TO T5 RETROFIT: Preliminary Economics

- The cost will probably be in excess of $40,000,000 – Hopefully the

DX Air-conditioning: Preliminary Economics

Conclusion:



- Engineering is an Art, Not a Science
- It is Not Perfect, Because not Perfect People are Designing, Contracting, Constructing, and Maintaining it
- Hopefully, We are All Going in the Right Direction

fini

B 472 Painting Shop - Proposed

- Reduce Face Area by Installing Movable Doors to Reduce Air Flow Requirements by Approximately Half

B 472 Painting Shop - Proposed

- Add a Paint Gun Trigger Control to Reduce Air Flow when not Painting

Various - Proposed

- Replace 11 Watt LED Single/Double Sided Exit Signs with Electroluminescent Exit Signs
- Life: 25 Years
- Battery Life is 5 Years
- SWDIV Fire Protection has Approved, pending Ambient Light Levels

B 464 Complex - Proposed

- Xeroscape/Irrigation Controls - Install irrigation to all NADEP areas. Replace limited areas with Xeroscape.
- Solar Powered Controllers